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THE HEREDITY OF THE UPRIGHT POSITION AND SOME OF ITS DISADVANTAGES.

MAN may be considered the only one of the higher animals capable of adjusting the condition of his surroundings to his needs or taste. The method of attaining the desired end is prompted by physical discomfort or psychical appreciation. The brain itself feels nothing and is therefore considered a sort of second self—more or less removed from the physical man both in popular conception and psychological teaching. The anatomists and physiologists however regard the brain as one of the physical organs direct in its relation to the structure and function of the body community—a relation lost even if self-evident in the maze of the probable physical side of thought.

It is man's knowledge—the development of his brain—that determines the adaptation of his environment. The physical man, the long-suffering house the brain lives in, is merely a convenient mechanical accessory to the mental self, and should this physical element in man force itself upon his consciousness, the inconvenience of a body is evident. The separation of man into brain and body! Whence came it?

We have little information concerning our remote ancestor to whom we generously apply the term "the" missing link, except that he was once not as high a form of animal as he is now, and that he was very hairy and surprisingly like the ape. He was possibly a recurring mutation or sport upon some simian limb—different from his brothers in that his brain was a little better developed. Just as men of to-day with exceptional brains distance their less gifted fellows, so this man—let us assume by his recurrence—developed a new type of animal bearing all the evolutionary evidences of his ancestry, possessed of a better thinking apparatus and because of it more able to survive and select among his kind those more fit. We can safely infer that the progressive evolution of man was due to his peculiarly advantageous relation of gray to white matter and that as the brain advanced the body followed at a respectful distance.

It is probable that this relatively gifted prehistoric being found it desirable to assume the permanent upright position as opposed to the semi-upright for the following reasons: In restricting locomotion to his hind legs and abandoning his arboreal habits, he freed the front legs and could use them entirely for prehensile purposes—organs well adapted to such variation in function and entailing little structural change. He was already endowed with sustained binocular vision as are all the primates, and had outgrown the nocturnal habits of the immediately preceding line of animals represented by the prosimian (half-apes of Madagascar).

The development of his front legs for prehensile purposes led to the acquirement of hand-dexterity, which is not hereditary but trained as every parent knows. Here his binocular vision troubled him first (and it troubles him more at the present time) because he began to apply the dexterity of his hands to that expression of brain development which tended to raise him higher and make him less dependent on his surroundings. He began to adapt his environment to himself in the fashioning of rude garments and in the manufacture of implements both warlike and domestic. He trained a convergence of his eyes in order that he might meet this self-imposed condition and to translate them from purely distance organs to structures that could see equally well near by and far off (contact-distance organs). This acquirement of accomodation shows its recent advent negatively in that it is about the first thing lost in the degeneracy of old age—the far-sightedness of the person over forty-five years.

Growing intelligence led to the transmission of more and more complicated ideas to other individuals in speech, whether gesticulation, spoken, pictorial or written.

These then are the few things in which egotistic man excels the animals: primarily the character of his brain development; secondarily, the maintenance of the upright position, the acquirement of hand dexterity, development of the accommodative apparatus in the eyes and training their convergence (cross eye); and lastly, in intelligent articulate speech. It is a fact, generally speaking, that those things last acquired are first lost, and those things first acquired are last lost; illustrated positively in that the baby walks before it talks, or even more completely in a purely negative manner. The person depressed by an anesthetic such as chloroform or ether, or in the gradual onset of drunkenness loses his faculties in about the following order: first, self-restraint or any and all of the finer sides of human nature last acquired; speech next becomes more or less incoherent; balancing becomes difficult; speech is reduced to noises before the individual returns to all-fours; vision is next lost, and when gone hearing soon follows; complete unconsciousness.

That our mental development is far in advance of our physical is illustrated nicely if we but compare the average man of to-day with say the mound builder. Our intelligence as the last acquired attribute is undoubtedly very plastic and capable of much variation in development. That it is the active factor in our advance is shown by an example such as this: Major C. E. Woodruff, U. S. A., found that the element of danger to the white man in the tropics was not the heat but the intense light. Enter knowledge of the conditions and specific intelligent adjustment of the environment to the white man who is recommended to wear white outer clothing, and dark—preferably black—underwear. Adaptation of the surroundings to a type of man who is not provided with sufficient pigment in the skin (melanin) to meet the conditions.

Thus intelligence daily exhibits those characteristics which have enabled us to survive in the struggle for existence. Just as our brain-development was the probable cause of our ascent so our brain-development may eventually cause our decline. Intelligent people select intelligent people—the brain-development is set at a premium—and ultimately the relation of the child's head to the birth-canal of the mother may be so disturbed that the life of the mother may be jeopardized in the fulfilment of nature's second law, if the child can be born in a viable condition. The physician is one of the greatest enemies to progressive evolution in the animal sense in that he is assisting in the selection (artificial) of those individuals who would be eliminated under normal (animal) conditions.

The last remark may appear to substantiate an erroneous and popular notion that the laws of "animal" evolution do not obtain for "man." The writer took exception to an article which was an open recommendation to mothers to bring their babies up on the bottle from the start and based on the premise that nature (save the term!) is doing away with the breast function. The breast is the last acquired sex organ; last acquired things are lost first in degenerative changes, and under normal conditions those babies that could not be nursed would die and the depleted stock be eliminated. Should we continue, as we must, to select those individuals bred from a stock that cannot nurse its young, it is not unlikely that the genital function will be suppressed (sterility).

Our brain-development may therefore lead us to four possibilities: (1) a return to a more or less normal relation of mental to physical development (the alleged inferior class); (2) elimination of those individuals possessed of too large a head (over-development); (3) elimination (prolonged by unnatural selection) of those individuals bred of a stock that cannot nurse its young; and (4) race suicide of the so-called higher classes.

The maintenance of the upright position was mentioned first among the secondary factors that contributed to man's ascent. First, because it was essential to a freeing of the hands and to the application of growing ideas. Without it nothing would have been accomplished and it must therefore be considered the second most important human attribute. Our hands after all are not unlike those of our far-removed cousins the apes. The chief difference apart from technical muscle separations is found in the thumb. This digit is a relatively short member in the ape and is tied down rather firmly to the side of the palm. The amount of opposition is poorly developed and other than in its length it resembles that of a child closely. A baby does not pick up an object off the table between the thumb and first finger at first, for such coordination of muscle-action (opposition of the thumb) is acquired and not hereditary. Rather it reverts to the monkey fashion and gradually draws the object to the edge of the table that it may clench its fingers about it. Later the infant trains an opposition of the thumb and learns that it may touch the base of the little finger with ease—a feat impossible in the highest ape. The sense of "feeling" is much better developed in other animals, but the sense of "touch" (popular meaning) is after all muscle control mainly of the thumb and index finger.

It has been stated that "man climbs his own ancestral tree" (Milnes Edwards) and that he carries on his person unmistakable evidences of his ancestry. Whatever the intrinsic or extrinsic factors may have been which prompted our remote forefather to assume and maintain the upright position, this much is true,—that despite the myriads of years he has spent in readjusting himself to the self-imposed and unnatural posture, it has been far from complete and will probably always remain imperfect. The upright position has many disadvantages—irreparable in the deficiency of adaptation — factors that even tend to eliminate the physical man—*prima facie* evidences of evolutionary development as opposed to divine creation.

Let us limit our attention to the three most important functions in animal life; respiration, or the obtaining of the necessary oxygen; digestion, or the obtaining of required water and food; and procreation, the perpetuation of the species. Let us remember that not only lack of adaptation to false position is of disadvantage but that the force of gravity is directed at right angles to what it would be were we on all-fours. Let us assume that it is the object of the writer to prove that not only is the adaptation to position mechanically faulty but that the individual is actually laboring under other evident disadvantages. Many conditions that carry people to the hospital daily must be omitted and no effort toward anything more than a few facts will be presented.

RESPIRATORY TRACT.

The vertebral column in the animal is placed about on the horizontal. The trunk is supported by four legs and the weight carried by the front legs is transmitted to more or less vertical ribs. Respiration in the animal, like that in man, is of two types—costal and diaphragmatic. Costal respiration is accomplished by swinging the vertical ribs forward—a movement not affected by gravity and requiring but little effort—for inspiration, and relaxing the muscles for expiration. Diaphragmatic breathing results from contraction of the diaphragm and horizontal displacement of abdominal viscera toward the tail, with passive return on expiration.

The assumption of the upright position resulted in several things. The support of the front legs was lost and they in turn are carried on ribs now placed horizontally. In costal respiration not only must the ribs be lifted against gravity but some of the weight of the upper extremity elevated as well in inspiration while expiration is assisted; the traction of the abdominal muscles, now used for balancing, must also be overcome. In diaphragmatic respiration, the increased intra-abdominal pressure (flat abdomen characteristic of man) must be counteracted. Partly as a result of this we find a difference in the type of respiration in man. The breathing is costal in character in either sex when asleep (more or less animal-like); when awake however it is subcostal and diaphragmatic in the male, while in the female it remains about the same (costal). Why now should the type of respiration in two sexes suddenly change (and daily) when "they get up on their hind legs?" Let us consider some of these reasons before passing to more or less direct results of the assumed posture on the respiratory tract.

The male as a rule is the more active. His activities tend toward greater development of the abdominal muscles used in balancing and consequent interference with costal respiration. Not only is the relatively greater weight of his upper extremities transmitted to horizontal ribs, but the use of his arm, especially where strength is demanded, necessitates a fixation of the upper five or six ribs, and respiration is confined mostly to the diaphragm. The fact that this type is acquired shows itself in the return to normal when asleep.

The type of respiration in the female remains the same because she more nearly approaches the animal type in that she does not carry as great a weight on her upper ribs and that she does not need arm-strength with fixation of the upper ribs; more important, however, is the amount of abdominal room required for the gestation of offspring where abdominal breathing would be markedly interfered with; and the third and least important reason is due to the control of any abdominal expansion by the corset. Should any woman doubt this, let her lace a little tight to exaggerate the experiment, take a pail of water in each hand (fixation of the upper ribs) and walk say up two flights of stairs. She will find the greatest inconvenience is not in carrying the weight but in breathing.

There is a tendency due to change in position (gravity) to make inspiration more difficult and expiration unnaturally easy, and as a result we hold our chests poorly expanded. Well illustrated is the so-called good chest expansion say by an example (centimeters are used instead of inches, because they illustrate the point better and the chest-expansion given is abnormally large — exaggeration).

Given a man with chest normal, 90 cms.; expanded, 100 cms.; and contracted, 85 cms.: the relation of 10 cms. expansion to 5 cms. contraction when compared with normal. Physiologically speaking this individual holds his chest one third expanded. Given another man with similar maximum and minimum, 100 and 85 cms. respectively, but who holds his chest at 95 cms. The latter keeps his lungs relatively two-thirds expanded. The former type of chest is a poor chest and common; the latter is a good type and rare. The frequency of the former type is due to the fact that the upright position is disadvantageous to proper lung-expansion, and for this reason children should be taught to "throw the chest out and the abdomen in"—an effort that ought to become a habit. Well what of it? What if we do not hold our chests well expanded?

We all know that we are breathing in germs all the time. Most of them are innocuous, some of them death-dealing (tubercle bacillus for example). The unexpanded areas of the lungs are weaker in that they are not exercising a normal function and here the tubercle bacillus has a better chance to lodge and multiply. For this reason tubercular nodules are found in the upper poorly expanded apices of the lungs so frequently that it is almost normal. Were it not for adaptability, more of us would be affected; as a matter of fact few of us escape infection which is walled off—no thanks to our mechanical defect in posture.

DIGESTIVE TRACT.

The digestive tract in the animal is attached to the back wall of the abdomen by a thin serous membrane known as the peritoneum. The membrane, however, is merely a lubricator, carrying between its layers vascular structures to and from the tract. The force of gravity tends to bring the viscera in apposition with the horizontal abdominal wall where they are supported. When the animal has eaten heartily, it rests, and lies down with its digestive tract indirectly on the ground.

The upright position hampers the digestive tract in many ways. In order that the individual breathe properly he must "throw his chest out and abdomen in" and crowd the already cramped tract against a curve in the vertebral column thrown to the front to compensate for the unnatural position. The peritoneum must now be used as a support, and about twenty feet of small intestine is hung from a vertical abdominal wall by this thin membrane, attached for a distance of say even five inches. The result is that the small intestines crowd down into the pelvis and against the weakest part of the now vertical front abdominal wall. Apart from this tendency toward dislocation, they may even come through the abdominal wall in the form of a rupture or hernia. Eighty-five per cent. of these ruptures (conservative estimate) are due to the upright position (gravity) and to irreparable faulty adaptation of the viscera to withstand the traction. The same is true of other abdominal viscera.

The digestive tract as the one great tract under the direct control of our intelligence is naturally long suffering. We probably eat too much and our habits are such that we do not rest after meals as the animal does but try to keep an excess of blood in two parts of the body—for digestion and for muscular effort or brain work at the same time. The consequences are evident to anyone who has gone in swimming or has tried to be particularly brilliant after a hearty meal. In the former case it is probably headache; in the latter instance, sleepiness. This is one of the strongest pleas for the after-dinner cigar or cigarette—it requires no effort and keeps the smoker quiet. Jokes after a Thanksgiving dinner are not appreciated; either the company is too dull (lack of blood in the brain) or it hurts them to laugh. This hurting to laugh is due more to increased weight of the digestive tract than to distension as such individuals are surprisingly comfortable when lying on their "stomachs." Reversion to animal position.

REPRODUCTIVE SYSTEM.

Every fit animal arrives at the period of maturity that it may exercise the procreative function—a general zoological law with some modifications. When the male and female have completed their natural mission in life they die. In some cases the life of the male is sacrificed in the act (bees); often the female lives only long enough to lay the eggs (moths); or the animals live beyond the procreative period for a certain length of time when degenerative stages set in and the animal is no longer fitted to cope with the environment.

The chief disadvantage of exercising the procreative function in man is mostly mechanical (lack of adaptation to the upright position) and therefore found in the female. Disadvantages also arise from a psychical source—exclusively human and un-animal—and due to intelligence. During pregnancy the mechanical accessory to the brain—the body—becomes seriously inconvenienced and evident. It interferes with what the possessor wishes to do, and hence the attempt is made on the part of *homo sapiens* to eliminate himself: (1) by prevention of conception; (2) by mechanical interference with pregnancy; (3) by restriction of the number of children; and (4) by refusing to accept the responsibility of having children. The last named reason is wholly worthy and a necessary accompaniment of false surroundings (domestication in the animal sense). The third point probably results from the desire of every parent that the children shall not only have the best chance but excel. The writer believes judgment should be reserved in such cases. Nature counteracts all of these strictly human characteristics very adequately in declaring such individuals unfit.

The disadvantages of the physical side are due to the fact that we are standing on our "hind legs." The abdominal room is cramped at best, and the vertically placed front abdominal wall gives poor support and does not distend well. So far the two important tracts of respiration and digestion have not seriously been incommoded. The increasing weight of the offspring, however, is of great disadvantage in the upright position. The pressure is directed against veins which themselves are working against the "head" due to translation in function. The pressure symptoms against the veins and nerves, particularly those of the lower extremities, interferes with their proper nutrition and in extreme cases gives rise to the so-called varicose veins, etc. Placed under normal animal conditions the helplessness of the pregnant human female would be eliminating. Compare the condition of the pregnant woman with that of the female animal which may carry even a greater proportionate weight of progeny, and compare again their physical adaptation to their respective conditions. The facts (natural conditions—in error—if you like) arraign themselves entirely against man, and he is forced to exhibit great intelligence to make even a good showing.

When man and woman attain a certain age (more definite in the female—about 45 years) the genital function is suppressed;—an evidence of the down grade on the curve of life and a beginning, physiologically speaking, of senility. It is at this stage that the animal is eliminated. The human being has increased his span of life gradually by counteracting degenerative changes, but he has not increased the useful period. Rather the increase in life, prolongs the period of senility by skillful adjustment of the environment (false teeth, dieting and what not). This period equals roughly one-third of human existence and in the majority of cases is not very productive.

It is not the writer's purpose to present a calamity oration or to attempt the superhuman and offer any suggestions as to what may be done. Rather to give food for thought and to convince the more egotistic of our number that we are far from perfect. To say that we would be better off on all-fours would be absurd. We have adapted ourselves imperfectly, and while we labor under distinct disadvantages, our progressive advance refutes any idea that we are withal a degenerative stock. It hurts no one to realize that he has an ancestry, that his Genesis has been Evolution, that he suffers inconveniences because his remote forefather assumed the upright,—rather he appreciates more nearly the ideal man, even if he be burdened with imperfections transmitted to him by a long line of forbears.

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